and heated with two fires, is to be ascribed entirely to the larger flues of the new house.

It therefore appears, that the simple application of as large flues as the circumcumstances of hot-houses will admit, would not only be attended with much advantage in point of economy, as a very small fire would be sufficient to maintain the temperature usually required in hot-houses; but, what perhaps is of more consequence, flues properly constructed upon this principle can be easily regulated, and will induce a much more uniform degree of heat. It seems from this experiment, that the flues in general use are of too small dimensions, that there is not capacity in them for allowing the heated particles of air to expand, and that the heat passes though the narrow flues, and makes its escape with the smoke in a latent state, without being allowed to act upon a surface large enough to rob it of its caloric.

Upon this principle churches and large halls might be heated; and one fire might be made to heat a much greater range of vineries than is in practice at present; it would also be a great improvement in the construction of hot-houses, and even of garden inclosures, to make the walls hollow,* as well on account of such a construction inclosing a space of air, which is an excellent non-conductor, as of the facility with which a fire may be applied, by converting the whole, or greater part, of the wall into a flue or receptacle for heated air. When this is to be done the fire-place should be kept as low as possible; and, after answering its purpose in the hot-house, the flue might be made to communicate with the hollow garden-wall, and the smoke made to escape at a chimney situated, according to circumstances, at a greater or less distance from the hot-house. An apartment heated with a flue of a large construction is less incident to sudden changes of temperature than where the flues are small. The heat in large flues can be regulated with much precision, and they are attended with the advantage of seldom or never requiring to be cleaned. In all chimnies of this kind an aperture should be made in the wall with a close shutter, near the top of the chimney, where a lighted candle or lamp should be introduced, for an hour or two, immediately after the fire is put on, in order to create a current, and thereby bring the smoke to issue at the chimney top.

* At Peterhead, in Aberdeenshire, there is a dwelling-house with hollow walls of brick work, belonging to a Mr. Leslie, of that place, who, I believe, has thoughts of taking out a patent for his ingenious method of making bricks, and building houses with a double or hollow walls.

On preventing the Worms in Carrots, and on preserving Colliflowers through a great part of the Winter; by Mr. Smith, of Keith Hall.

(From the Transactions of the Caledonian Horticultural Society.)

I. On preventing the Worms in Carrots.

About five years ago I had a heap of pigeon-dung, which lay through the winter months on a quarter of the garden. Having occasion to remove all this dung to other parts of the garden, I laid down the quarter with carrots, and was surprised to observe an extraordinary production of this vegetable on the spot where the dung had lain, both with respect to their size and cleanness. And although some worms might have been found in the other parts of the quarter, yet I could perceive none in the spot above alluded to.

From that time, this circumstance induced me to adopt the practice of sowing my carrots always in one particular spot of ground, which I have annually manured well with pigeon-dung, laying on always as much of it, though of a hot nature as if it had been rotten horse-dung. And I have the satisfaction to observe, that I have never failed to have an extraordinary crop, and, what is of more consequence, can venture to affirm, that a worm could not be found in my carrots during the four years that I have continued this practice.

Last year, in thinning my carrots, I transplanted a few of them into a piece of ground that had been well dunged with rotten horse-dung; and though they grew very well, yet they were so much cankered that they were almost unfit for any use.

All this leads me to think, that pigeon-dung is a good preventive of the worm in carrots.

II. On preserving Colliflowers through a great part of the Winter.

As colliflower is a most desirable vegetable, so it deserves to be kept as long for use as possible.

In 1808 I had a large quantity of this vegetable in full head in the beginning of November. Being at a loss for a shed, or such place as is commonly used for hanging it up, in order to preserve it, I dug a pit along the bottom of a wall, about eighteen inches in depth, and much about the same breadth. On a dry day I pulled up the stocks of colliflower, keeping the leaves as entire as possible, and wrapped them round the flower. I began at one end of the above mentioned pit, laying in my colliflower with the roots uppermost, and the tops inclining downwards, the roots of the one layer covering the tops of the other, and so on with the whole of my stock. The pits were then covered closely up with earth, and beaten smooth with the back of the spade, in order that the rain might run off.

It is to be observed, that the covering had a considerable slope from the wall. The experiment succeeded to my wish; and I was enabled occasionally to give a dish of fine colliflower till the middle of January 1809.

On Mills put in Motion by the re-action of Water, erected by M. Mannoury, Dectot.

(Extracted from a Report made to the Institute at Paris, by Messrs. Perier, Prony, and Carnot.)

The mechanism of these mills is founded on the principle of the re-action of the water on the vessel or reservoir from which it escapes.

The inventor causes the water to enter the mill-wheel at the lower part, along the axle. The column which brings the water, encloses the pivot upon which it turns. This water is brought to the reservoir through a curved canal, by means of which, the mill wheel and the mill which it puts in motion, are placed by the side of the reservoir, and neither above nor below it, which would much injure the working and the simplicity of the machine as we shall shew.

The idea of employing in mechanics the re-action of water as a moving power is not new; however, it does not appear that it has hitherto been practised with the advantage that can be derived from the assistance of a re-acting machine.

M. Mannoury, by bringing the water from below by means of a canal, as we have said, reduces his machine to a simple water-wheel, to the axis of which is immediately fixed the moving mill-stone. Whereas in most of our mills, the wheel that receives the action of the water, acts upon the stone by the intermedium of one or more cogged wheels.

Those of M Mannoury therefore, which do not require a greater fall than our ordinary mills and even less, have a great advantage, in that the mill wheel which receives the action of the water, bears the moving mill-stone immediately upon its axle, which greatly simplifies the machinery, and considerably diminishes the resistance.

Although the water enters with little velocity into the mill-wheel, it causes it to turn very fast, because the apertures for its egress being much smaller than those for its entrance, the velocity at the entrance is reciprocally much smaller than it is at the egress; but this velocity at the egress is not an absolute velocity, for otherwise there would result a spontaneous augmentation of power, which would not agree with the principles of mechanics.

It must be observed that this machine, when it has received its just proportions, acquires of itself, the motion which is necessary for its maximum of effect; for when once the moving force is properly applied to it, the amount of the actual power which it tends to display, can no more annihilate than multiply itself.

By making an analytical calculation of M. Mannoury's machine, we have obtained results remarkable for their simplicity, and the facility of their application; that is to say, the apertures for the entrance and the egress of the water, being proportioned as they ought to be in order to obtain the greatest effect; then,

1. The re-action, that is, the force of pressure which acts upon the mill wheel at each of the apertures of egress, is equal to the weight of a column of water, of the same base as the aperture, and of the height of the level of water in the reservoir.

2. The velocity of the rotation of the mill-wheel to the same point, is to the velocity due to the height of the level of the water in the reservoir, as the aperture for the entrance of the water into the mill-wheel, is to the sum of the apertures of egress.

Whence it follows, by multiplying this force and this velocity, that the effect produced by the machine in a given time, is equal to the weight of all the water that the reservoir can furnish during this